CLAIMS

1. Surface profiling apparatus for obtaining surface profile data for a sample surface, the apparatus comprising:

light source providing means for providing a light source;

light directing means for directing light from the light source providing means along a sample path towards the sample surface and along a reference path towards a reference surface such that light reflected by the sample surface and light reflected by the reference surface interfere;

moving means for moving at least one of the sample surface along the sample path and the reference surface along the reference path to effect relative movement between the sample surface and the reference surface along a measurement path;

sensing means for sensing light intensity resulting from interference between light reflected from the reference surface and regions of the sample surface to provide a set of light intensity data comprising light intensity data values with each light intensity data value representing the sensed light intensity associated with a corresponding one of said regions, the sensing means being arranged to sense light intensity at intervals along the measurement path to provide a number of sets of such light intensity data;

data processing means for processing the sets of light intensity data to determine from the light intensity data values associated with each sensed region a position along the measurement path at which a predetermined feature occurs in the light intensity data for that sensed region; and

surface profile determining means for determining from the positions at which the predetermined feature occurs in the light intensity data for the different sensed regions the relative surface heights of the different sensed regions to provide a surface profile,

the apparatus further comprising:

display means for displaying image data representing a set of light intensity data;

image enhancing means for enhancing the image data to facilitate the detection by a user of the interference fringes; and

user operable control means for controlling operation of the image enhancing means.

2. Apparatus according to claim 1, wherein the image enhancing means comprises gradient determining means for determining from a set of light intensity data light intensity

gradient data and modifying means for modifying the image data to be displayed in accordance with the determined gradient data.

3. Apparatus according to claim 1, wherein the image enhancing means comprises contrast determining means for determining contrast difference data by comparing the set of light intensity data with a reference set of light intensity data and modifying means for modifying the image data to be displayed in accordance with the determined contrast difference data.

4. Apparatus according to claim 1, wherein the image enhancing means comprises gradient determining means for determining from a set of light intensity data light intensity gradient data, contrast determining means for determining contrast difference data by comparing the set of light intensity data with a reference set of light intensity data and modifying means for modifying the image data to be displayed in accordance with the determined gradient data and contrast difference data.

5. Apparatus according to claim 2 or 4, wherein the gradient determining means is arranged to determine local gradient data associated with a light intensity data value by comparing the light intensity data values associated with regions on either side of the region that provided the light intensity data value.

6. Apparatus according to claim 2 or 4, wherein the regions are arranged in a rectangular array and the gradient determining means is arranged to determine local gradient data associated with a light intensity data value by comparing the light intensity data values associated with regions at respective ends of a diagonal containing the region associated with the light intensity data value.

7. Apparatus according to claim 2 or 4, wherein the regions are arranged in a rectangular xy array and the gradient determining means is arranged to determine local gradient data associated with a light intensity data value associated with a region at coordinates x,y in the array by comparing the light intensity data values associated with regions at coordinates x+1, y+1 and x-1, y-1.

8. Apparatus according to claim 2, wherein the regions are arranged in a rectangular xy array and the modifying means is arranged to determine a modified intensity data value I_M for a light intensity data value I associated with the region at coordinates x,y in accordance with:

$$I_M = 64 + I/2 + (I_{-1} - I_{+1})x4$$

where I_{-1} and I_{+1} are the intensity data values associated with the regions at coordinates x+1, y+1 and x-1, y-1.

9. Apparatus according to claim 3 or 4, wherein the contrast determining means is arranged to determine the contrast difference data by subtracting from the intensity data value I of the set the corresponding intensity data value I_R of the reference set.

10. Apparatus according to claim 3, wherein the modifying means is arranged to determine a modified intensity data value I_M for a light intensity data value I in accordance with:

$$I_M = 64 + I/2 + (I - I_R)x4$$

where I_R is the corresponding intensity data value of the reference set.

11. Apparatus according to claim 4, wherein the regions are arranged in a rectangular xy array and the modifying means is arranged to determine a modified intensity data value I_M for a light intensity data value I associated with the region at coordinates x,y in accordance with:

$$I_M = 64 + I/2 + (I - I_R)x4 + (I_{-1} - I_{+1})x4$$

where I_{-1} and I_{+1} are the intensity data values associated with the regions at coordinates x+1, y+1 and x-1, y-1 and I_R is the corresponding intensity data value of the reference set.

12. Apparatus according to any of claims 3, 4, 9, 10, 11, further comprising user operable means for selecting the reference set.

13. Apparatus according to any of the preceding claims, wherein the image enhancing means comprises user-selectable filter means for restricting the wavelength range of the light source.

14. Apparatus according to claim 13, wherein the user-selectable filter means comprises a filter assembly mounted in a light path from the light source and having a user movable filter carrier for enabling the user to move a filter into and out of the light path.

15. Apparatus according to claim 14, wherein the filter carrier comprises a rotatable disc member having one or more filters eccentrically mounted thereto.

16. Surface profiling apparatus for obtaining surface profile data for a sample surface, the apparatus comprising:

light source providing means for providing a light source;

light directing means for directing light from the light source providing means along a sample path towards the sample surface and along a reference path towards a reference surface such that light reflected by the sample surface and light reflected by the reference surface interfere;

moving means for moving at least one of the sample surface along the sample path and the reference surface along the reference path to effect relative movement between the sample surface and the reference surface along a measurement path;

sensing means for sensing light intensity resulting from interference between light reflected from the reference surface and a two-dimensional array of regions of the sample surface to provide a set of light intensity data comprising light intensity data values, each light intensity data value representing the sensed light intensity associated with a corresponding one of said regions and each light intensity data value being one of a number of different values dependent upon the sensed light intensity, the sensing means being arranged to sense light intensity at intervals along the measurement path to provide a number of sets of such light intensity data;

data processing means for processing the sets of light intensity data to determine from the light intensity data values associated with each sensed region a position along the measurement path at which a predetermined feature occurs in the light intensity data

for that sensed region; and surface profile determining means for determining from the positions at which the predetermined feature occurs in the intensity data for the different sensed regions the relative surface heights of the different sensed regions to provide the surface profile,

the apparatus further comprising:

display means for displaying image data representing a set of light intensity data;

image data generating means for generating image data to be displayed from the light intensity data values of a set of light intensity data, the image data generating means being arranged to cause the majority of the light intensity data values to appear to be represented by a single colour with the apparent lightness of the colour varying with the light intensity data value such that the lightness either increases or decreases with increase in the light intensity data value and to cause at least one of a light intensity data value representing a highest light intensity, a light intensity data value representing a lowest light intensity and light intensity data values representing midrange light intensities to be displayed so as to appear to be of a different colour to enable the user to identify the light intensity level represented by that light intensity data value.

17. Apparatus according to claim 16, further comprising user-operable control means for enabling a user to control a light output intensity of the light source.

18. Apparatus according to claim 16 or 17, wherein the highest level represents saturation light intensity and the lowest represents zero light intensity.

19. Apparatus according to claim 16, 17 or 18, wherein the image data generating means is arranged to cause at least two of the light intensity data value representing the highest light intensity, the light intensity data value representing the lowest zero light intensity and the light intensity data values representing midrange light intensities to be displayed so as to appear to be of different colours from the colour to enable the user to identify the light intensity level represented by that light intensity data value.

20. Apparatus according to claims 16, 17 or 18, wherein the image data generating means is arranged to cause the light intensity data value representing the highest light intensity, the light intensity data value representing the lowest light intensity and the light intensity data values representing the midrange light intensities to be displayed so as to

appear to be of different colours from the colour to enable the user to identify the light intensity level represented by that light intensity data value.

21. Apparatus according to any of claims 16 to 20, wherein the image data generating means is arranged to cause the light intensity data value representing the highest light intensity to be displayed so as to appear to be yellow.

22. Apparatus according to any of claims 16 to 21, wherein the image data generating means is arranged to cause the light intensity data value representing the lowest light intensity to be displayed so as to appear to be red

23. Apparatus according to any of claims 16 to 22, wherein the image data generating means is arranged to cause the light intensity data values representing the mid-range light intensities to be displayed so as to appear to be green.

24. Apparatus according to any of claims 16 to 23, wherein the image data generating means is arranged to cause the colour to be at least one of blue and grey.

25. An interferometer apparatus comprising:

light directing means for directing along a sample path towards the sample surface and along a reference path towards a reference surface such that light reflected by the sample surface and light reflected by the reference surface interfere;

moving means for moving at least one of the sample surface along the sample path and the reference surface along the reference path to effect relative movement between the sample surface and the reference surface along a measurement path;

sensing means for sensing light intensity resulting from interference between light reflected from the reference surface and regions of the sample surface to provide a set of light intensity data comprising light intensity data values with each light intensity data value representing the sensed light intensity associated with a corresponding one of said regions, the sensing means being arranged to sense light intensity at intervals along the measurement path to provide a number of sets of such light intensity data;

data processing means for processing the sets of light intensity data to determine from the light intensity data values associated with each sensed region a position along

the measurement path at which a predetermined feature occurs in the light intensity data for that sensed region;

image enhancing means for enhancing image data to be displayed on a display to facilitate the detection by a user of the interference fringes in image data; and

user operable control means for controlling operation of the image enhancing means.

26. An interferometer data processing apparatus comprising:

receiving means for receiving sets of light intensity data values resulting from interference between light reflected from the reference surface and regions of the sample surface with each light intensity data value representing the sensed light intensity associated with a corresponding one of said regions and each set of light intensity data values representing the light intensity sensed a different one of a number of intervals along a measurement path;

data processing means for processing the sets of light intensity data to determine from the light intensity data values associated with each sensed region a position along the measurement path at which a predetermined feature occurs in the light intensity data for that sensed region;

image enhancing means for enhancing the image data to be displayed on a display to facilitate the detection by a user of the interference fringes in image data; and

user operable control means for controlling operation of the image enhancing means.

27. An interferometer user interface apparatus comprising:

receiving means for receiving a set of light intensity data values resulting from interference between light reflected from the reference surface and regions of the sample surface with each light intensity data value representing the sensed light intensity associated with a corresponding one of said regions;

image enhancing means for enhancing the image data to be displayed on a display to facilitate the detection by a user of the interference fringes in image data; and

user operable control means for controlling operation of the image enhancing means.

28. Apparatus according to claim 25, 26 or 27, wherein the image enhancing means comprises gradient determining means for determining from a set of light intensity data light intensity gradient data and modifying means for modifying the image data to be displayed in accordance with the determined gradient data.

29. Apparatus according to claim 25, 26 or 27, wherein the image enhancing means comprises contrast determining means for determining contrast difference data by comparing the set of light intensity data with a reference set of light intensity data and modifying means for modifying the image data to be displayed in accordance with the determined contrast difference data.

30. Apparatus according to claim 25, 26 or 27, wherein the image enhancing means comprises gradient determining means for determining from a set of light intensity data light intensity gradient data, contrast determining means for determining contrast difference data by comparing the set of light intensity data with a reference set of light intensity data and modifying means for modifying the image data to be displayed in accordance with the determined gradient data and contrast difference data.

31. Apparatus according to claim 28 or 30, wherein the gradient determining means is arranged to determine local gradient data associated with a light intensity data value by comparing the light intensity data values associated with regions on either side of the region that provided the light intensity data value.

32. Apparatus according to claim 28 or 30, wherein the regions are arranged in a rectangular array and the gradient determining means is arranged to determine local gradient data associated with a light intensity data value by comparing the light intensity data values associated with regions at respective ends of a diagonal containing the region associated with the light intensity data value.

33. Apparatus according to claim 28 or 30, wherein the regions are arranged in a rectangular xy array and the gradient determining means is arranged to determine local gradient data associated with a light intensity data value associated with a region at coordinates x,y in the array by comparing the light intensity data values associated with regions at coordinates x+1, y+1 and x-1, y-1.

34. Apparatus according to claim 28, wherein the regions are arranged in a rectangular xy array and the modifying means is arranged to determine a modified intensity data value I_M for a light intensity data value I associated with the region at coordinates x,y in accordance with:

$$I_M = 64 + I/2 + (I_{-1} - I_{+1})x4$$

where I_{-1} and I_{+1} are the intensity data values associated with the regions at coordinates x+1, y+1 and x-1, y-1.

35. Apparatus according to claim 29 or 30, wherein the contrast determining means is arranged to determine the contrast difference data by subtracting from the intensity data value I of the set the corresponding intensity data value I_R of the reference set.

36. Apparatus according to claim 29, wherein the modifying means is arranged to determine a modified intensity data value I_M for a light intensity data value I in accordance with:

$$I_M = 64 + I/2 + (I - I_R)x4$$

where I_R is the corresponding intensity data value of the reference set.

37. Apparatus according to claim 30, wherein the regions are arranged in a rectangular xy array and the modifying means is arranged to determine a modified intensity data value I_M for a light intensity data value I associated with the region at coordinates x,y in accordance with:

$$I_M = 64 + I/2 + (I - I_R)x4 + (I_{-1} - I_{+1})x4$$

where I_{-1} and I_{+1} are the intensity data values associated with the regions at coordinates x+1, y+1 and x-1, y-1 and I_R is the corresponding intensity data value of the reference set.

38. Apparatus according to any of claims 29, 30, 35, 36, or 37, further comprising user operable means for selecting the reference set.

39. Apparatus according to any of claims 25 to 38, wherein the image enhancing means comprises user-selectable filter means for restricting the wavelength range of the light source.

40. Apparatus according to claim 39, wherein the user-selectable filter means comprises a filter assembly mounted in a light path from the light source and having a user movable filter carrier for enabling the user to move a filter into and out of the light path.

41. Apparatus according to claim 40, wherein the filter carrier comprises a rotatable disc member having one or more filters eccentrically mounted thereto.

42. An interferometer user interface apparatus comprising:

receiving means for receiving a set of light intensity data values resulting from interference between light reflected from the reference surface and regions of a sample surface with each light intensity data value representing the sensed light intensity associated with a corresponding one of said regions and each light intensity data value being one of a number of different values dependent upon the sensed light intensity;

display pixel data generating means for generating display pixel data to be displayed on a display from the light intensity data values of a set of light intensity data, the display pixel data generating means being arranged to cause the majority of the light intensity data values to be represented by what appears to the human eye to be a single colour with the apparent lightness of the colour varying with the light intensity data value such that the lightness either increases or decreases with increase in the light intensity data value and to cause at least one of a light intensity data value representing a highest light intensity, a light intensity data value representing a lowest light intensity and midrange light intensity data to be displayed in what appears to the human eye to be a different colour to enable the user to identify the light intensity level represented by that light intensity data value.

43. Apparatus according to claim 42, further comprising user-operable control means for enabling a user to control a light output intensity of the light source.

44. Apparatus according to claim 42 or 43, wherein the highest level represents saturation light intensity and the lowest represents zero light intensity.

45. Apparatus according to claim 42, 43 or 44, wherein the image data generating means is arranged to cause at least two of the light intensity data value representing the highest light intensity, the light intensity data value representing the lowest zero light intensity and the light intensity data representing a midrange to be displayed so as to appear to be of different colours from the colour to enable the user to identify the light intensity level represented by that light intensity data value.

46. Apparatus according to claim 42, 43 or 44, wherein the image data generating means is arranged to cause the light intensity data value representing the highest light intensity, the light intensity data value representing the lowest light intensity and the light intensity data representing the midrange to be displayed in different colours from each other and the colour to enable the user to identify the light intensity level represented by that light intensity data value or values.

47. Apparatus according to any of claims 42 to 46, wherein the image data generating means is arranged to cause the light intensity data value representing the highest light intensity to be displayed as yellow.

48. Apparatus according to any of claims 42 to 47, wherein the image data generating means is arranged to cause the light intensity data value representing the lowest light intensity to be displayed as red

49. Apparatus according to any of claims 42 to 48, wherein the image data generating means is arranged to cause the light intensity data representing mid-range light intensities to be displayed as green.

50. Apparatus according to any of claims 42 to 49, wherein the image data generating means is arranged to cause the colour to appear to be at least one of blue and grey.

51. Apparatus according to any of claims 25 to 50, further comprising a display.

52. Surface profiling apparatus for obtaining surface profile data for a sample surface, the apparatus comprising:

light directing means for directing light from a light source providing means along a sample path towards the sample surface and along a reference path towards a reference surface such that light reflected by the sample surface and light reflected by the reference surface interfere;

moving means for moving at least one of the sample surface along the sample path and the reference surface along the reference path to effect relative movement between the sample surface and the reference surface along a measurement path;

sensing means for sensing light intensity resulting from interference between light reflected from the reference surface and regions of the sample surface to provide a set of light intensity data comprising light intensity data values with each light intensity data value representing the sensed light intensity associated with a corresponding one of said regions, the sensing means being arranged to sense light intensity at intervals along the measurement path to provide a number of sets of such light intensity data;

data processing means for processing the sets of light intensity data to determine from the light intensity data values associated with each sensed region a position along the measurement path at which a predetermined feature occurs in the light intensity data for that sensed region, the data processing means being operable to generate, using gradient data derived from the light intensity data, display data for causing each surface region to be represented on a display by a corresponding display pixel such that the relative heights of the said surface region can be visually distinguished.

53. Apparatus according to claim 52, wherein the data processing means is arranged to modify the intensity value data in accordance with local gradient data to produce the display data.

54. Surface profiling apparatus for obtaining surface profile data for a sample surface, the apparatus comprising:

light directing means for directing light from a light source providing means along a sample path towards the sample surface and along a reference path towards a reference

surface such that light reflected by the sample surface and light reflected by the reference surface interfere;

moving means for moving at least one of the sample surface along the sample path and the reference surface along the reference path to effect relative movement between the sample surface and the reference surface along a measurement path;

sensing means for sensing light intensity resulting from interference between light reflected from the reference surface and regions of the sample surface to provide a set of light intensity data comprising light intensity data values with each light intensity data value representing the sensed light intensity associated with a corresponding one of said regions, the sensing means being arranged to sense light intensity at intervals along the measurement path to provide a number of sets of such light intensity data;

data processing means for processing the sets of light intensity data to determine from the light intensity data values associated with each sensed region a position along the measurement path at which a predetermined feature occurs in the light intensity data for that sensed region, the data processing means being operable to extract a form of the reference surface from the sets of light intensity data.

55. An interferometer filter assembly comprising a housing having a filter carrier mounted in the housing so as to be rotatable about an axis, the filter carrier having a plurality of filters spaced around the axis and having a peripheral surface provided with land portions each associated with a corresponding filter and each distinguishable by a user for allowing a user to rotate the filter carrier to bring a selected filter to a predetermined position.

56. An assembly according to claim 55, wherein the lands are distinguishable by touch.

57. An assembly according to claim 55 or 56, wherein rotation of the filter carrier is indexed.

58. Apparatus according to any of claims 1 to 54 having a filter assembly according to claim 55, 56 or 57.

59. A method for obtaining surface profile data for a sample surface, the method comprising:

directing light along a sample path towards the sample surface and along a reference path towards a reference surface such that light reflected by the sample surface and light reflected by the reference surface interfere;

moving at least one of the sample surface along the sample path and the reference surface along the reference path to effect relative movement between the sample surface and the reference surface along a measurement path;

sensing light intensity resulting from interference between light reflected from the reference surface and regions of the sample surface to provide a set of light intensity data comprising light intensity data values with each light intensity data value representing the sensed light intensity associated with a corresponding one of said regions so as to sense light intensity at intervals along the measurement path to provide a number of sets of such light intensity data;

processing the sets of light intensity data to determine from the light intensity data values associated with each sensed region a position along the measurement path at which a predetermined feature occurs in the light intensity data for that sensed region; and

determining from the positions at which the predetermined feature occurs in the light intensity data for the different sensed regions the relative surface heights of the different sensed regions to provide a surface profile,

the method further comprising:

displaying image data representing a set of light intensity data;

enhancing the image data to facilitate the detection by a user of the interference fringes in response to operation of a user operable control.

60. A method according to claim 59, wherein the image enhancing comprises determining from a set of light intensity data light intensity gradient data and modifying the image data to be displayed in accordance with the determined gradient data.

61. A method according to claim 59, wherein the image enhancing comprises determining contrast difference data by comparing the set of light intensity data with a reference set of light intensity data and modifying the image data to be displayed in accordance with the determined contrast difference data.

62. A method according to claim 59, wherein the image enhancing comprises determining from a set of light intensity data light intensity gradient data, determining contrast difference data by comparing the set of light intensity data with a reference set of light intensity data and modifying the image data to be displayed in accordance with the determined gradient data and contrast difference data.

63. A method according to claim 60 or 62, wherein the gradient determining determines local gradient data associated with a light intensity data value by comparing the light intensity data values associated with regions on either side of the region that provided the light intensity data value.

64. A method according to claim 60 or 62, wherein the regions are arranged in a rectangular array and the gradient determining determines local gradient data associated with a light intensity data value by comparing the light intensity data values associated with regions at respective ends of a diagonal containing the region associated with the light intensity data value.

65. A method according to claim 60 or 62, wherein the regions are arranged in a rectangular xy array and the gradient determining determines local gradient data associated with a light intensity data value associated with a region at coordinates x,y in the array by comparing the light intensity data values associated with regions at coordinates x+1, y+1 and x-1, y-1.

66. A method according to claim 60, wherein the regions are arranged in a rectangular xy array and the modifying determines a modified intensity data value I_M for a light intensity data value I associated with the region at coordinates x,y in accordance with:

$$I_M = 64 + I/2 + (I_{-1} - I_{+1})x4$$

where I_{-1} and I_{+1} are the intensity data values associated with the regions at coordinates x+1, y+1 and x-1, y-1.

67. A method according to claim 61 or 62, wherein the contrast determining determines the contrast difference data by subtracting from the intensity data value I of the set the corresponding intensity data value I_R of the reference set.

68. A method according to claim 61, wherein the modifying determines a modified intensity data value I_M for a light intensity data value I in accordance with:

$$I_M = 64 + I/2 + (I - I_R)x4$$

where I_R is the corresponding intensity data value of the reference set.

69. A method according to claim 62, wherein the regions are arranged in a rectangular xy array and the modifying determines a modified intensity data value I_M for a light intensity data value I associated with the region at coordinates x,y in accordance with:

$$I_M = 64 + I/2 + (I - I_R)x4 + (I_{-1} - I_{+1})x4$$

where I_{-1} and I_{+1} are the intensity data values associated with the regions at coordinates x+1, y+1 and x-1, y-1 and I_R is the corresponding intensity data value of the reference set.

70. A method according to any of claims 61, 62, 67, 68, 69, further comprising receiving input from a user operable control to select the reference set.

71. A method according to any of claims 59 to 70, wherein the image enhancing comprises restricting the wavelength range of the light source.

72. A method according to claim 71, wherein restricting the wavelength range of the light source is effected by a user rotating a filter assembly mounted in a light path to move a filter into and out of the light path.

73. A method according to claim 72, wherein the filter assembly comprises a rotatable disc member having one or more filters eccentrically mounted thereto.

74. A method for obtaining surface profile data for a sample surface, the method comprising:

directing light along a sample path towards the sample surface and along a reference path towards a reference surface such that light reflected by the sample surface and light reflected by the reference surface interfere;

moving at least one of the sample surface along the sample path and the reference surface along the reference path to effect relative movement between the sample surface and the reference surface along a measurement path;

sensing light intensity resulting from interference between light reflected from the reference surface and a two-dimensional array of regions of the sample surface to provide a set of light intensity data comprising light intensity data values, each light intensity data value representing the sensed light intensity associated with a corresponding one of said regions and each light intensity data value being one of a number of different values dependent upon the sensed light intensity so as to sense light intensity at intervals along the measurement path to provide a number of sets of such light intensity data;

processing the sets of light intensity data to determine from the light intensity data values associated with each sensed region a position along the measurement path at which a predetermined feature occurs in the light intensity data for that sensed region; and

determining from the positions at which the predetermined feature occurs in the intensity data for the different sensed regions the relative surface heights of the different sensed regions to provide the surface profile,

the method further comprising:

generating image data for display from the light intensity data values of a set of light intensity data so as to cause the majority of the light intensity data values to appear to be represented by a single colour with the apparent lightness of the colour varying with the light intensity data value such that the lightness either increases or decreases with increase in the light intensity data value and to cause at least one of a light intensity data value representing a highest light intensity, a light intensity data value representing a lowest light intensity and light intensity data values representing midrange light intensities to be displayed so as to appear to be of a different colour to enable the user to identify the light intensity level represented by that light intensity data value.

75. A method according to claim 74, further comprising enabling a user to control a light output intensity of the light source.

76. A method according to claim 74 or 75, wherein the highest level represents saturation light intensity and the lowest represents zero light intensity.

77. A method according to claim 74, 75 or 76, wherein the image data generating causes at least two of the light intensity data value representing the highest light intensity, the light intensity data value representing the lowest zero light intensity and the light intensity data values representing midrange light intensities to be displayed so as to appear to be of different colours from the colour to enable the user to identify the light intensity level represented by that light intensity data value.

78. A method according to claim 74, 75 or 76, wherein the image data generating causes the light intensity data value representing the highest light intensity, the light intensity data value representing the lowest light intensity and the light intensity data values representing the midrange light intensities to be displayed so as to appear to be of different colours from the colour to enable the user to identify the light intensity level represented by that light intensity data value.

79. A method according to any of claims 74 to 78, wherein the image data generating causes the light intensity data value representing the highest light intensity to be displayed so as to appear to be yellow.

80. A method according to any of claims 74 to 79, wherein the image data generating causes the light intensity data value representing the lowest light intensity to be displayed so as to appear to be red

81. A method according to any of claims 74 to 80, wherein the image data generating causes the light intensity data values representing the mid-range light intensities to be displayed so as to appear to be green.

82. A method according to any of claims 74 to 81, wherein the image data generating causes the colour to be at least one of blue and grey.

83. A data processing method comprising:

directing along a sample path towards the sample surface and along a reference path towards a reference surface such that light reflected by the sample surface and light reflected by the reference surface interfere;

moving at least one of the sample surface along the sample path and the reference surface along the reference path to effect relative movement between the sample surface and the reference surface along a measurement path;

sensing light intensity resulting from interference between light reflected from the reference surface and regions of the sample surface to provide a set of light intensity data comprising light intensity data values with each light intensity data value representing the sensed light intensity associated with a corresponding one of said regions so as to sense light intensity at intervals along the measurement path to provide a number of sets of such light intensity data;

processing the sets of light intensity data to determine from the light intensity data values associated with each sensed region a position along the measurement path at which a predetermined feature occurs in the light intensity data for that sensed region;

enhancing image data to be displayed on a display to facilitate the detection by a user of the interference fringes in image data in response to user input.

84. A data processing method comprising:

receiving sets of light intensity data values resulting from interference between light reflected from the reference surface and regions of the sample surface with each light intensity data value representing the sensed light intensity associated with a corresponding one of said regions and each set of light intensity data values representing the light intensity sensed a different one of a number of intervals along a measurement path;

processing the sets of light intensity data to determine from the light intensity data values associated with each sensed region a position along the measurement path at which a predetermined feature occurs in the light intensity data for that sensed region;

enhancing the image data to be displayed on a display to facilitate the detection by a user of the interference fringes in image data in response to user input.

85. An image data display method comprising:

receiving a set of light intensity data values resulting from interference between light reflected from the reference surface and regions of the sample surface with each light

intensity data value representing the sensed light intensity associated with a corresponding one of said regions;

enhancing the image data to be displayed on a display to facilitate the detection by a user of the interference fringes in image data in response to operation of a user operable control.

86. A method according to claim 83, 84 or 85, wherein the image enhancing comprises determining from a set of light intensity data light intensity gradient data and modifying the image data to be displayed in accordance with the determined gradient data.

87. A method according to claim 83, 84 or 85, wherein the image enhancing comprises determining contrast difference data by comparing the set of light intensity data with a reference set of light intensity data and modifying the image data to be displayed in accordance with the determined contrast difference data.

88. A method according to claim 83, 84 or 85, wherein the image enhancing comprises determining from a set of light intensity data light intensity gradient data, determining contrast difference data by comparing the set of light intensity data with a reference set of light intensity data and modifying the image data to be displayed in accordance with the determined gradient data and contrast difference data.

89. A method according to claim 86 or 88, wherein the gradient determining determines local gradient data associated with a light intensity data value by comparing the light intensity data values associated with regions on either side of the region that provided the light intensity data value.

90. A method according to claim 86 or 88, wherein the regions are arranged in a rectangular array and the gradient determining determines local gradient data associated with a light intensity data value by comparing the light intensity data values associated with regions at respective ends of a diagonal containing the region associated with the light intensity data value.

91. A method according to claim 86 or 88, wherein the regions are arranged in a rectangular xy array and the gradient determining determines local gradient data associated with a light intensity data value associated with a region at coordinates x,y in the array by comparing the light intensity data values associated with regions at coordinates x+1, y+1 and x-1, y-1.

92. A method according to claim 86, wherein the regions are arranged in a rectangular xy array and the modifying determines a modified intensity data value I_M for a light intensity data value I associated with the region at coordinates x,y in accordance with:

$$I_M = 64 + I/2 + (I_{-1} - I_{+1})x4$$

where I_{-1} and I_{+1} are the intensity data values associated with the regions at coordinates x+1, y+1 and x-1, y-1.

93. A method according to claim 87 or 8, wherein the contrast determining determines the contrast difference data by subtracting from the intensity data value I of the set the corresponding intensity data value I_R of the reference set.

94. A method according to claim 87, wherein the modifying determines a modified intensity data value I_M for a light intensity data value I in accordance with:

$$I_M = 64 + I/2 + (I - I_R)x4$$

where I_R is the corresponding intensity data value of the reference set.

95. A method according to claim 88, wherein the regions are arranged in a rectangular xy array and the modifying determines a modified intensity data value I_M for a light intensity data value I associated with the region at coordinates x,y in accordance with:

$$I_M = 64 + I/2 + (I - I_R)x4 + (I_{-1} - I_{+1})x4$$

where I_{-1} and I_{+1} are the intensity data values associated with the regions at coordinates x+1, y+1 and x-1, y-1 and I_R is the corresponding intensity data value of the reference set.

96. A method according to any of claims 87, 88, 93, 94, or 95, further comprising receiving input from a user operable control for selecting the reference set.

97. An interference image display method comprising:

receiving a set of light intensity data values resulting from interference between light reflected from the reference surface and regions of a sample surface with each light intensity data value representing the sensed light intensity associated with a corresponding one of said regions and each light intensity data value being one of a number of different values dependent upon the sensed light intensity;

generating display pixel data to be displayed on a display from the light intensity data values of a set of light intensity data to cause the majority of the light intensity data values to be represented by what appears to the human eye to be a single colour with the apparent lightness of the colour varying with the light intensity data value such that the lightness either increases or decreases with increase in the light intensity data value and to cause at least one of a light intensity data value representing a highest light intensity, a light intensity data value representing a lowest light intensity and midrange light intensity data to be displayed in what appears to the human eye to be a different colour to enable the user to identify the light intensity level represented by that light intensity data value.

98. A method according to claim 97, wherein the image data generating causes at least two of the light intensity data value representing the highest light intensity, the light intensity data value representing the lowest zero light intensity and the light intensity data representing a midrange to be displayed so as to appear to be of different colours from the colour to enable the user to identify the light intensity level represented by that light intensity data value.

99. A method according to claim 97, wherein the image data generating causes the light intensity data value representing the highest light intensity, the light intensity data value representing the lowest light intensity and the light intensity data representing the midrange to be displayed in different colours from each other and the colour to enable the user to identify the light intensity level represented by that light intensity data value or values.

100. A surface profiling method, the method comprising:

directing light along a sample path towards the sample surface and along a reference path towards a reference surface such that light reflected by the sample surface and light reflected by the reference surface interfere;

moving at least one of the sample surface along the sample path and the reference surface along the reference path to effect relative movement between the sample surface and the reference surface along a measurement path;

sensing light intensity resulting from interference between light reflected from the reference surface and regions of the sample surface to provide a set of light intensity data comprising light intensity data values with each light intensity data value representing the sensed light intensity associated with a corresponding one of said regions so as to sense light intensity at intervals along the measurement path to provide a number of sets of such light intensity data;

processing the sets of light intensity data to determine from the light intensity data values associated with each sensed region a position along the measurement path at which a predetermined feature occurs in the light intensity data for that sensed region so as to generate, using gradient data derived from the light intensity data, display data for causing each surface region to be represented on a display by a corresponding display pixel such that the relative heights of the said surface region can be visually distinguished.

101. A method according to claim 100, wherein the data processing modifies the intensity value data in accordance with local gradient data to produce the display data.

102. A signal comprising processor-implementable instructions for causing processor means to carry out a method in accordance with any of claims 59 to 101.

103. A storage medium carrying processor-implementable instructions for causing processor means to carry out a method in accordance with any of claims 59 to 101.